Metal Progress Subject Index

Vol. 95, January 1969 through June 1969

Aircraft
Giant Landing Gears for the Giant Jet, by Carl R. Weymueller 3-77
Jet Engine Materials for the 1970's, by Matthew J. Donachie Jr. and Elihu F. Bradley 3-61
Materials and Processes for the Boeing 747, Staff Report 3-74
SST Propels Titanium Into Production Era, by C. C. Lacy 3-69
Titanium's Role in Superjet Engines, by Willard M. Garcia and M. D. Kiessling 3-65

Alloy steels
Continuous Cooling Transformation Diagrams for AISI 1010, 1010 Mo, and 1010 Mo-B, by Clements F. zurLippe and John D. Grozier (ds) 2-88

Aluminum alloys
Causes of Molten Aluminum-Water Explosions and Their Prevention, by Paul D. Hess and Kenneth J. Brondyke 4-93
A New Look at Sintered Aluminum Alloy Powder Metal Parts, by Walter A. Dean 4-69
Organic Quenchant Aids Heat Treatment of Dip-Brazed Aluminum Parts, by James K. Scott 3-80
What Four New Aluminum Alloys Have to Offer, by Lawrence W. Mayer 5-68
Why Hotworking Characteristics Vary, by Hugh J. McQueen 1-131

Anistropy
New Knowledge About Sheet Steels — Strain Hardening and Anistropy, by Donald J. Blickwede 1-84

Annealing
New Knowledge About Sheet Steel . . .
How Composition and Processing Affect Annealed Material, by Donald J. Blickwede 2-83
The Mechanism of Annealing, by Donold J. Blickwede 2-83
Problems With Continuous Annealing, by Donald J. Blickwede 5-86

Anodizing
Trends in Anodizing in Europe, by P. Grass 6-96

Beryllium
New Forging Techniques for Beryllium, by George Glenn and Arthur F. Hayes. 3-131
Thin Chromium Layer Raises Properties of Beryllium Compact, by Simon J. Morana and George J. Jagaciak 4-132

Boron
Forum: Progress in Filaments . . . Boron Carbide Resists Heat, by Louis R. McCreight 3-110
New World of Composites . . . Boron-Epoxy Systems In Action, by Marvin S. Howeth and John S. Hocking 3-104
What Can We Expect in the 1970's, by James N. Fleck and Edward J. Jablonowski 3-99
Processing Success Story: Boron Carbide Body Armor, by John V. E. Hansen... 2-111

Brass
Why Hotworking Characteristics Vary, by Hugh J. McQueen 1-131

Bursting
Central Bursting in Rods Prevented by Die Design, by Zeev Zimmerman and Betzalel Avitzur 2-103

Carbon steels
Machinability Ratings for Cold-Drawn, Carbon-Steel Bars (ds) 1-97

Castings
Causes of Molten Aluminum-Water Explosions and Their Prevention, by Paul D. Hess and Kenneth J. Brondyke ... 4-93
Induced Stresses Improve Casting Performance, by Xarifa Bean and Lawson E. Marsh 5-131
The Revolution in Iron Castings, by Harry E. Chandler 5-60
Specifications and Properties of Ductile (Nolular) Iron Castings (ds) 5-76
Specifications and Properties of Gray Iron Castings (ds) 5-74

Clad metals
What You Can Do With Clad Precious Metals, by Marvin B. Happ and Joseph A. Willoughby 2-95

Coatings
Guide for Selecting Minimum Thicknesses for Quality Coatings (ds) 6-110

Composites
Forum: Progress in Filaments . . . Boron Carbide Resists Heat, by Louis R. McCreight 3-110
Look for More Efficient Materials, by Edward Epremian 3-106
Silicon Carbide: High Strength at High Temperatures, by John A. Alexander.. 3-124
Where Graphite Serves, by Roger Bacon. 3-116
New World of Composites . . . Boron-Epoxy Systems in Action, by Marvin S. Howeth and John S. Hocking 3-104
What We Can Expect in the 1970's, by James N. Fleck and Edward J. Jablonowski 3-99
Jet Engine Materials for the 1970's, by Matthew J. Donachie Jr. and Elihu F. Bradley 3-61
What You Can Do With Clad Precious Metals, by Marvin B. Happ and Joseph A. Willoughby 2-95

Cooling curves
Continuous Cooling Transformation Diagrams for AISI 1010, 1010 Mo, and 1010 Mo-B, by Clements F. zurLippe and John D. Grozier (ds) 2-88

Copper
Why Hotworking Characteristics Vary, by Hugh J. McQueen 1-131

Degassing
An Evaluation of the Gazal Porous Plug Process, by Walter E. Gruver 4-117

Diffusion bonding
Technology From the Apollo . . . Diffusion Bonding Makes Complex Designs Possible, by Charles W. Haynes 3-83

Editorial
Abating Pollution Is a Technological Problem, by Allen G. Gray 5-59
A Bilateral Materials System, by Allen G. Gray 2-59
Don't Lock Out Progress, by Allen G. Gray 4-59
The 'Finding Out' Barrier, by Allen G. Gray 6-65
The Performance Concept, by Allen G. Gray 1-75
Vanguard of New Technologies, by Allen G. Gray 3-59

Electropainting
Electropainting in Europe, by J. G. Ransome 6-75

Electron microscopy
Analyzing Fracture Characteristics by Electron Microscopy, by Austin Phillips and Victor Kerlins 5-81
How Electron Fractography Works in Practice, by James A. Scott 5-84

Electroslag melting
Electroslag Remelting . . . An Efficient Way to Make Clean Steel, by Manfred Wahlster and Alok Choudhury 4-107

Failures
Analyzing Diesel Engine Failures, by Roger C. Tittel 4-74
Analyzing Fracture Characteristics by Electron Microscopy, by Austin Phillips and Victor Kerlins 5-81
Central Bursting in Rods Prevented by Die Design, by Zeev Zimmerman and Betzalel Avitzur 2-103
Failure Prevention Starts with Education, by Donald J. Wulpi 1-105
How Electron Fractography Works in Practice, by James A. Scott 5-84

Forging
New Forging Techniques for Beryllium, by George Glenn and Arthur F. Hayes. 3-131

Fractography
Analyzing Fracture Characteristics by Electron Microscopy, by Austin Phillips and Victor Kerlins 5-81
How Electron Fractography Works in Practice, by James A. Scott 5-84

Finishing
Double Sealing Stops Blooming of Anodic Films, Staff Report 6-92
Electropainting in Europe, by J. G. Ransome 6-75
Four Ways to Apply Low-Reflectivity Finishes, Staff Report 6-91
Guide for Selecting Minimum Thicknesses for Quality Coatings (ds) 6-110
Ideas for Better Finishing
Anodized Zinc Coatings 6-145
Blasting Produces Frosted Finish on Variety of Materials 6-141
How IBM Assures Reliability of Electroplated Parts 5-166
New Barrel Plating Process Conserves Gold, Boosts Quality 6-154
Solving Gold Plating Problems Adds Appearance, Cuts Costs 6-144
Ultrasonically Cleaned Oil Filters for Jet Engines Are Re-Used 6-154
Where Automatic Buffing Pays Off in Processing Small Parts 6-158
Zinc Plating Without Cyanide Licks Waste Disposal Problem 6-165
Plating Wear-Resistant Coatings on Titanium, by Robert D. Krienke 6-89
Systems Approach to Organic Coatings
Electron Beam Curing, by J. E. Hinsch 6-72
How to Apply the Coatings, by L. R. LeBras 6-70
How to Cure Coatings, by A. M. Twilley 6-72
How to Select the Correct Coating by T. R. Matthews and M. M. Coburn.. 6-67
Trends in Anodizing in Europe 6-96
Ways to Test Electroplated Coatings, by Robert McWhorter and George L. Smith 6-115
Where to Consider Plated Plastics, by Harry E. Chandler 6-80
Zinc Platers Assess Ways to Ease Effluent Problem, Staff Report 6-131

Graphite
New World of Composites . . . What We Can Expect in the 1970's by James N. Fleck and Edward J. Jablonowski 3-99
Forum: Progress in Filaments . . . Where Graphite Serves, by Roger Bacon 3-116

Gray iron castings
Specifications and Properties of Gray Iron Castings (ds) 5-74

Heat treatment
Automatic Salt Bath Line Cuts Cost, Time, and Rejects 2-86
Organic Quenchant Aids Heat Treatment of Dip-Brazed Aluminum Parts, by James K. Scott 3-80

High-strength steels
Forum: Where We Stand in Welding High-Strength Steels . . . E14018 Covered Electrode Is Designed for HY130, by Harry E. Reid 2-69
Filler Metals for HY Steels Took Years to Develop, by Robert T. Telford 2-71
How Metal-Arc Welding Compares With Other Methods, by Hallock C. Campbell 2-68
Many Maraging Grades Are Now Available, by Bernard W. Schaff 2-74
9-4-20: A Weldable Alloy for Tough Applications, by Gerald D. Ries and H. P. Munger 2-76
Procedures for Welding HY 140 Pressure Vessels, by Ward D. Abbott 2-72
Process Considerations Play Important Role, by Karl E. Dorschu 2-80
Three New PH Stainlesses Offer Weldability, Performance, by R. Harry Espy. 2-79
Where AM350 and AM355 Are Gaining in Usage, by Robert H. Kaltenhauser.. 2-77
Where Two New Grades Fit Into the Picture, by Allan M. Rathbone 2-67
With Maraging Steels, Heat Input Is Critical, by Ward D. Abbott 2-73

Hotworking
Why Hotworking Characteristics Vary, by Hugh J. McQueen 1-131

Impact Tests
Determining the Toughness of Thin-Walled Tubes, by Vito J. Colangelo.. 5-117

Iron alloys
Fe-6Al . . . An Economical Alloy for Elevated-Temperature Use, by Amedee Roy and John M. Corwin 4-70

Landing gear
Giant Landing Gears for the Giant Jet, by Carl R. Weymueller 3-77

Machinability
Machinability Ratings for Cold-Drawn, Carbon-Steel Bars (ds) 1-97
Materials selection
Jet Engine Materials for the 1970's, by Matthew J. Donachie Jr. and Elihu F. Bradley 3-61
A Look Ahead at Transportation Materials for the Seventies 1-110
Materials and Processes for the Boeing 747, Staff Report 3-74
Metallography
How Metallography Helps the Materials Engineer 2-60
Metal powders
A New Look at Sintered Aluminum Alloy Powder Metal Parts, by Walter A. Dean 4-69
Properties and Applications of Powder Metallurgy Parts (ds) 4-80
Round Table Report . . . The Expanding Role of Powder Metallurgy 4-61
Nickel alloys
Turbine Blades From Start to Finish, by Carl R. Weymueller 1-81
Why Hotworking Characteristics Vary, by Hugh J. McQueen 1-131
Nodular iron castings
The Revolution in Iron Castings, by Harry E. Chandler 5-60
Specifications and Properties of Ductile (Nodular) Iron Castings (ds) 5-76
Plastics
Where to Consider Plated Plastics, by Harry E. Chandler 6-80
Plating
Four Ways to Apply Low-Reflectivity Finishes, Staff Report 6-91
Plating Wear-Resistant Coatings on Titanium, by Robert D. Krienke 6-89
Ways to Test Electroplated Coatings, by Robert McWhorter and George L. Smith 6-115
Where to Consider Plated Plastics, by Harry E. Chandler 6-80
Zinc Platers Assess Ways to Ease Effluent Problem, Staff Report 6-131
Pollution abatement
Abating Pollution Is a Technological Problem, by Allen G. Gray 5-59
Eight Case Histories on Pollution Control . . . Automating Surveillance and Control, by Paul E. Bardet 5-92
Controlling Pollution in Aluminum Smelting, by Raynal W. Andrews Jr. 5-96
Controlling Pollution in Cokemaking, by P. D. Kostenbader and J. W. Flecksteiner 5-94
Controlling Pollution in Heat Treating, by Carl F. Burling 5-93
Controlling Pollution in Machining Operations, by Leon J. Page 5-97
Controlling Pollution in Rolling Operations, by F. A. Simons 5-93
Controlling Pollution in Steelmaking, by Donald R. Baker 5-95
Working With Local Government, by Ranald F. Goodspeed 5-90
GM's Central Foundry Div. Sets Precedent With . . . A Total Approach ... 5-98
Practical Waste Disposal in Aluminum Finishing Plants, by Edgar G. Paulson. 5-100
Powder metallurgy parts
A New Look at Sintered Aluminum Alloy Powder Metal Parts, by Walter A. Dean 4-69
Properties and Applications of Powder Metallurgy Parts (ds) 4-80
Round Table Report . . . The Expanding Role of Powder Metallurgy 4-61
Thin Chromium Layer Raises Properties of Beryllium Compact, by Simon J. Morana and George J. Jagaciak 4-132
Precious metals
What You Can Do With Clad Precious Metals, by Marvin B. Happ and Joseph A. Willoughby 2-95
Quenching
Organic Quenchant Aids
Heat Treatment of Dip-Brazed Aluminum Parts, by James K. Scott 3-80
Sheet
New Knowledge About Sheet Steel . . . How Composition and Processing Affect Annealed Material, by Donald J. Blickwede 4-87
The Mechanism of Annealing, by Donald J. Blickwede 2-83
The Phenomena of Yielding, by Donald J. Blickwede 6-120
Problems With Continuous Annealing, by Donald J. Blickwede 5-86
Strain Hardening and Anistropy, by Donald J. Blickwede 1-84
Silicon carbide
Forum: Progress in Filaments . . . Silicon Carbide: High Strength at High Temperatures, by John A. Alexander 3-124
Stainless steels
How Accurate Are Methods for Measuring Ferrite?, by George A. Ratz and Russell B. Gunia 1-76
Steels
New Knowledge About Sheet Steel . . . How Composition and Processing Affect Annealed Material, by Donald J. Blickwede 4-87
The Mechanism of Annealing, by Donald J. Blickwede 2-83
The Phenomena of Yielding, by Donald J. Blickwede 6-120
Problems With Continuous Annealing, by Donald J. Blickwede 5-86
Strain Hardening and Anisotropy, by Donald J. Blickwede 1-84
Trip Steel Is Ready for Use, by Edward J. Dulis and Vijay K. Chandhok 1-101
Strain hardening
New Knowledge About Sheet Steels — Strain Hardening and Anisotropy, by Donald J. Blickwede 1-84
Spacecraft
Technology From the Apollo: Diffusion Bonding Makes Complex Designs Possible, by Charles W. Haynes 3-83
Technology Forecast
Technology Forecast 1969 1-17
Testing
How Accurate Are Methods for Measuring Ferrite?, by George A. Ratz and Russell B. Gunia 1-76
Titanium alloys
Properties, Specifications, and Applications for Wrought Titanium Alloys (ds) 3-88
SST Propels Titanium Into Production Era, by C. C. Lacy 3-69
Titanium's Role in Superjet Engines, by Willard M. Garcia and M. D. Kiessling 3-65
Transportation
A Look Ahead at Transportation Materials for the Seventies 1-110
Tubing
Determining the Toughness of Thin-Walled Tubes, by Vito J. Colangelo .. 5-117
Selecting Metal Tubing for Flexing Applications, by James D. Bean 4-138
Turbine engines
Induced Stresses Improve Casting Performance, by Xarifa Bean and Lawson E. Marsh 5-131
Jet Engine Materials for the 1970's, by Matthew J. Donachie Jr. and Elihu F. Bradley 3-61
Titanium's Role in Superjet Engines, by Willard M. Garcia and M. D. Kiessling 3-65
Turbine Blades From Start to Finish, by Carl R. Weymueller 1-81
Welding
Forum: Where We Stand in Welding High-Strength Steels . . . E14018 Covered Electrode Is Designed for HY130, by Harry E. Reid 2-69
Filler Metals for HY Steels Took Years to Develop, by Robert T. Telford 2-71
How Metal-Arc Welding Compares With Other Methods, by Hallock C. Campbell 2-68
Many Maraging Grades Are Now Available, by Bernard W. Schaff 2-74
9-4-20: A Weldable Alloy for Tough Applications, by Gerald D. Ries and H. P. Munger 2-76
Procedures for Welding Hy 140 Pressure Vessels, by Ward D. Abbott 2-72
Process Considerations Play Important Role, by Karl E. Dorschu 2-80
Three New PH Stainlesses Offer Weldability, Performance, by R. Harry Espy 2-79
Where AM350 and AM355 Are Gaining in Usage, by Robert H. Kaltenhauser.. 2-77
Where Two New Grades Fit Into the Picture, by Allen M. Rathbone 2-67
With Maraging Steels, Heat Input Is Critical, by Ward D. Abbott 2-73
Welding in European Shipyards, by James E. Norcross 1-88

Author Index

Abbott, Ward D. 2-72, 2-73
Alexander, John A. 3-124
Andreotti, Eugene R. 4-60
Andrews, Raynal W. Jr. 5-96
Avitzur, Betzalel 2-103

Bacon, Roger 3-116
Baker, Donald R. 5-95
Bardet, Paul E. 5-92
Bean, James D. 4-138
Bean, Xarifa 5-131
Belden, Byron B. 4-60
Blickwede, Donald J. 1-84; 2-83; 4-87; 5-86; 6-120
Bradley, Elihu F. 3-60
Brondyke, Kenneth J. 4-93
Brown, Royal A. 6-67
Burling, Carl F. 5-93

Campbell, Hallock C. 2-68
Chandhok, Vijay K. 1-101
Chandler, Harry E. 5-60; 6-80
Choudhury, Alok 4-107
Coburn, M. M. 6-66
Colangelo, Vito J. 5-117
Corwin, John M. 4-70

Dean, Walter A. 4-60; 4-68
Doelker, William J. 4-60
Donachie, Matthew J. 3-60
Dorschu, Karl E. 2-80
Dulis, Edward J. 1-101

Epremian, Edward 3-106
Espy, Harry 2-79

Fleck, James N. 3-99
Flecksteiner, J. W. 5-94

Garcia, Willard M. 3-65
Glenn, George 3-131
Goodspeed, Ranald F. 5-90
Grass, P. 6-96
Gray, Allen G. 1-75; 2-59; 3-59; 4-59; 5-59; 6-65
Grozier, John D. 2-88
Gruver, Walter E. 4-117
Gunia, Russell B. 1-76

Hansen, John V. E. 2-111
Hayes, Arthur F. 3-131
Happ, Marvin B. 2-95
Harrison, Lew D. 6-145
Haynes, Charles W. 3-85
Helsel, Jess 4-60
Hess, Paul D. 4-93
Hinsch, J. E. 6-72
Hocking, John S. 3-104
Holmes, Ross R. 4-60
Howeth, Marvin S. 3-104
Huseby, Robert A. 4-60

Jablonowski, Edward J. 3-99
Jagaciak, George J. 4-132

Kaltenhauser, Robert 2-77
Kerlins, Victor 5-81
Kick, Robert J. 4-60
Kiessling, M. D. 3-65
Kortovich, Charles S. 4-60
Kostenbader, P. D. 5-94
Kravic, Andrew F. 4-60
Krienke, Robert D. 6-89

Lacy, C. C. 3-69
LeBras, L. R. 6-70

Marsh, Lawson E. 5-131
Matthews, T. R. 6-66
Mayer, Lawrence W. 5-68
McCreight, Louis R. 3-110
McQueen, Hugh J. 1-131
McWhorter, Robert 6-115
Morana, Simon J. 4-132
Mulcavage, Thomas 4-60
Munger, H. P. 2-76

Norcross, James E. 1-88

Otto, George 4-60

Page, Leon J. 5-97
Paulson, Edgar G. 5-100
Phillips, Austin 5-81

Ransome, J. G. 6-75
Rathbone, Allan M. 2-67
Ratz, George A. 1-76
Reid, Harry F. 2-69
Ries, Gerald D. 2-76
Roll, Kempton H. 4-60
Roy, Amedee 4-70

Sarnes, Myron C. 4-60
Schaff, Bernard W. 2-74
Schneider, Peter V. 4-60
Scott, James A. 5-84
Scott, James K. 3-80
Shafer, William M. 4-60
Simons, F. A. 5-93
Smith, Charles W. 4-60
Smith, George L. 6-115

Telford, Robert T. 2-71
Twilley, A. M. 6-72

Wahlster, Manfred 4-107
Webber, H. M. 4-60
Weymueller, Carl R. ..1-81; 2-60; 3-77
Willoughby, Joseph A. 2-95
Wulpi, Donald J. 1-105

ZurLippe, Clements F. 2-88

METAL PROGRESS

Subject Index

Vol. 96, July 1969 through December 1969

Aircraft
New Material, Design Make Beryllium Aircraft Brakes Possible 1-109

Alloy steels
Properties of Alloys for Low-Temperature and Cryogenic Service (ds) ... 1-71
Saving by Substituting for Alloy Steels, by Marion M. Fox 6-95
Typical Mechanical Properties of Selected Carbon and Alloy Steels (ds) 4-153

Aluminum alloys
Aluminum Extrusions in the 70's, by F. W. Boynton 5-127
Aluminum vs Steel in Transmission Line Structures, by L. A. Kirkpatrick 3-82
The Future of Copper and Aluminum in Auto Radiators . . . Brazing Aluminum in a Dry Air Atmosphere, by J. R. Terrill 6-70
The Future of Copper and Aluminum in Auto Radiators . . . Fluxless Vacuum Brazing of Aluminum, by Harry K. Herr 6-68
Holding Down the Cost of Special Aluminum Fasteners, by Louis Zanin... 6-123
Materials Systems for High-Speed Trains . . . II — The All-Aluminum TurboTrain, by Fred L. Siegrist 6-103
Properties of Alloys for Low-Temperature and Cryogenic Service (ds) 1-71

Applied research
The 6 Hats of the Applied Research Man, by Donald J. Henry 5-81

Atmosphere control
Progress in Process Control . . . IV — The Solid-Electrolyte Oxygen Sensor Its Features and Uses, by H. S. Spacil 5-106

Bearings
Meeting Competition in the 1970's . . . Next-Generation Bearing Materials, by Thomas W. Morrison 4-174

Beryllium alloys
New Material, Design Make Beryllium Aircraft Brakes Possible 1-109

Boron steels
Cooling Transformation Diagram for AISI 86B40 (ds) 5-92
A New Group of Boron-Treated Steels, by John A. Rinebolt 3-117

Brass
The Future of Copper and Aluminum in Auto Radiators . . . The Roles of Copper and Brass 6-73

Brazing
The Future of Copper and Aluminum in Auto Radiators . . . Brazing Aluminum in a Dry Air Atmosphere, by J. R. Terrill 6-70
Fluxless Vacuum Brazing of Aluminum, by Harry K. Herr 6-68

Carbon steels
Saving by Substituting for Alloy Steels, by Marion M. Fox 6-95
Typical Mechanical Properties of Selected Carbon and Alloy Steels (ds) 4-153

Carburizing
Determining Carburizing Times and Temperatures (ds) 3-93
A Practical Way to Determine Carburizing Time and Temperature, by Charles F. Lewis 3-90
Progress in Process Control . . . I — New Insights Into Carburizing and Control of Carbon Potential, by Raymond L. Davis II 5-99

Cobalt alloys
FSX-414 — An Alloy for Gas Turbines, by Allan D. Foster and Chester T. Sims 1-83

Continuous casting
Continuous Casting Promises Improved Steels, Higher Productivity, Staff Report 3-109

Cooling curves
Cooling Transformation Diagram for AISI 86B40 (ds) 5-92

Copper alloys
The Future of Copper and Aluminum in Auto Radiators . . . New Copper Alloy Meets New Needs, by W. E. Johnston 6-76
The Roles of Copper and Brass 6-73

Cryogenics
'Cold' Technology Has Bright Future, by Allen G. Gray 1-51
Cryogenic Stretch Forming Improves Strength of Vessels, by Arthur Cozewith 1-64
Cryoquenching Eliminates Distortion, by E. M. Holub 1-62
New Steel Has Cryogenic Potential, by Carl E. Spaeder, Jr., John C. Majetich, and Kenneth G. Brickner 1-57
Properties of Alloys for Low-Temperature and Cryogenic Service (ds) ... 1-71
Selecting Structural Materials for Cryogenic Service, by Fred R. Schwartzberg 1-52
Welding Metals for Cryogenic Service — Pulsed-Power Welding Has Out-of-Position Capability, by Larry M. Layden 1-59
Welding Metals for Cryogenic Service — Short-Arc Welding Technique Minimizes Magnetic Problems in 9% Ni Steel 1-61

Dimensional measurements
New Knowledge About Sheet Steel . . . Controlling the Dimensions, by Donald J. Blickwede 3-99

Density measurement
Estimating Alloy Densities, by Frederick C. Hull 5-139

Editorial
Adding to Performance Appeal, by Allen G. Gray 2-65
'Cold' Technology Has Bright Future, by Allen G. Gray 1-51
Improved Steels Coming in 1970's, by Allen G. Gray 3-67
It's 1970 — Are You Ready?, by Allen G. Gray 4-127
The True Role of the Applied Researcher, by Allen G. Gray 5-65
You and the Metric System, by Allen G. Gray 6-67

Electric discharge machining
Meeting Competition in the 1970's . . . How We Will Machine, by Edward Krabacher 4-177

Electrochemical machining
Meeting Competition in the 1970's . . . How We Will Machine, by Edward Krabacher 4-177

Electrolytic grinding
Meeting Competition in the 1970's . . . How We Will Machine, by Edward Krabacher 4-177

Extrusion
Aluminum Extrusions in the 70's, by F. W. Boynton 5-127

Failures
Fatigue Failures in Sheet Metal, by J. Richard Wood and Stanley B. Oxborrow 1-68

Fasteners
Fasteners Meet Superneeds of Aerospace Industry
Are Joint Fatigue Tests Realistic?, by Clarence K. Brown 3-74
Coatings Resist Joint Corrosion, by Edward Taylor 3-72
Controlled-Interference Fits Add Fa-

tigue Life, by Bruce D. Reid 3-79
Crimping Techniques Make Nuts Fit Tight, by Clayton Giessner 3-76
A Fastener That Clamps and Seals, by John T. Bingham 3-80
How and Where Load-Determining Bolts Are Used, by Richard H. Blakeley 3-78
New Materials Extend High-Temperature Capability, by David W. Schofield 3-70
Straight-Shanked Pins Improve Fatigue Properties, by Roger B. Whiteside 3-81
Systems Approach Is a Must, by William J. Greening 3-69
Titanium Combines Strength, Weight-Saving, by George H. Drayton 3-71
What Large-Diameter Bolts Offer, by Russell G. Sherman 3-75
Holding Down the Cost of Special Aluminum Fasteners, by Louis Zanin .. 6-123

Forming
Beta III Titanium Features 'Cold' Formability, by John B. Guernsey, Vincent C. Petersen, and Edward J. Dulis 5-121
Cryogenic Stretch Forming Improves Strength of Vessels, by Arthur Cozewith 1-64
Forming High-Strength Steels, by Robert E. Jacobs 2-99
Meeting Competition in the 1970's ... How We Will Cold-Form Plastics, by Walter F. Matras and William R. Meadors 4-165
Meeting Competition in the 1970's ... How We Will Predict Sheet Metal Formability, by Arthur S. Kasper .. 4-159

Gas turbines
FSX-414 — An Alloy for Gas Turbines, by Allan D. Foster and Chester T. Sims 1-83

Hardenability curves
New Formulas for Calculating Hardenability Curves, by Erwin Just 5-87

Heat treatment
Cryoquenching Eliminates Distortion, by E. M. Holub 1-62
Determining Carburizing Times and Temperatures (ds) 3-93
A Practical Way to Determine Carburizing Time and Temperature, by Charles F. Lewis 3-90
Meeting Competition in the 1970's — How We Will Heat Treat, by Carl R. Weymueller 4-135
Progress in Process Control ... I — New Insights into Carburizing and Control of Carbon Potential, by Raymond L. Davis II 5-99
Progress in Process Control ... III — Vacuum Sensors for Heat-Treating Applications, by Paul A. Stoudt 5-104

High-strength steels
Bringing the Ultrahigh-Strength Steels Up to Date, by A. M. Hall 2-103
Composition, Properties, and Producers of High-Strength Steels (ds) 2-89
Developments in Plate and Structural High-Strength Steels, by William J. Murphy and Ralph B. G. Yeo 3-85
Forming High-Strength Steels, by Robert E. Jacobs 2-99
How to Weld High-Strength Steels, by Neale E. Orrok 2-79
New Grades: What They Are; Where They're Used?
ASTM A517-Grade J Maximizes Properties ... II — Good Resistance to Fatigue, by Emil G. Signes, Paul R. Slimmon, and George F. Melloy 2-70
ASTM A517-Grade J Maximizes Properties ... I — Strength With Flatness, by George F. Melloy 2-69
Extra Fine Grain Structure Makes Strong, Formable Steel, by John G. Grozier and Michael Korchynsky ... 2-67
High-Strength Grade Modified for Special Use, by Clifford E. Rowden 2-75
An HSLA Steel for Heavy Sections, by Robert L. Hickey and Edward V. Bravenec 2-75
Plate Steels With Guaranteed Impact Properties, by Ronald M. Jamieson . 2-68
A 75,000 Psi Heat-Treated Grade, by Albert Hoersch, Jr. 2-72
Sheets Compete With Other Products ... I — Low-Carbon Martensitic Grades, by William H. McFarland and Harold L. Taylor 2-73
Sheets Compete With Other Products ... II — Parts Strain Age During Paint Curing, by Bernard S. Levy . 2-74
Steels for Farm and Construction Equipment, by Alexander H. Jolly Jr. 2-78
Titanium-Strengthened Grades, by James H. Smith and John J. Vett .. 2-76
Weathering Steel Favored by Architects, by Seymour K. Coburn 2-77
9 Uses of High-Strength Steels 2-106
What You Should Know About Specifications for High-Strength Steels, by Carl R. Weymueller 2-84

Inclusions
New Knowledge About Sheet Steel ... Inclusions and Surface Imperfections, by Donald J. Blickwede 6-98

Joining
Fasteners Meet Superneeds of Aerospace Industry
Are Joint Fatigue Tests Realistic?, by Clarence K. Brown 3-74
Coatings Resist Joint Corrosion, by Edward Taylor 3-72
Controlled-Interference Fits Add Fatigue Life, by Bruce D. Reid 3-79
Crimping Techniques Make Nuts Fit Tight, by Clayton Giessner 3-76
A Fastener That Clamps and Seals, by John T. Bingham 3-80
How and Where Load-Determining Bolts Are Used, by Richard H. Blakeley 3-78
New Materials Extend High-Temperature Capability, by David W. Schofield 3-70
Straight-Shanked Pins Improve Fatigue Properties, by Roger B. Whiteside 3-81
Systems Approach Is a Must, by William J. Greening 3-69
Titanium Combines Strength, Weight-Saving, by George H. Drayton 3-71
What Large-Diameter Bolts Offer, by Russell G. Sherman 3-75

Jominy hardenability
New Formulas for Calculating Hardenability Curves, by Erwin Just 5-87

Machining
Getting the Most From Your Machining Dollar, by Robert L. Vaughn and Herman B. Barish 1-99
Meeting the Competition of the 1970's ... How We Will Machine, by Edward Krabacher 4-177

Maraging steels
An Extra-Strong Maraging Steel, by Richard J. Henry and Robert A. Cary. 3-127

Materials Application Competition
1969 Mac Winners Put Ideas to Work, by Neale E. Orrok 6-111

Materials engineering
Meeting Competition in the 1970's ... The Materials Engineer Today and Tomorrow, Survey Report 4-141

Materials selection
Meeting Competition in the 1970's ... Coming Changes in Materials, Processes, MP Round Table 4-129
Saving by Substituting for Alloy Steels, by Marion M. Fox 6-95

Metric system
Common Units for Converting From the English to the Metric (SI) System (ds) 6-91
What's Being Done About the Metric System?, Staff Report 6-78

Nickel alloys
Properties of Alloys for Low-Temperature and Cryogenic Service (ds) ... 1-71

Nodular iron castings
Combining Three Parts Into One Adds Reliability, Staff Report 3-137

Nondestructive testing
Making Reference Radiographs for Steel Welds, by Roy M. Gustafson and Edward L. Criscuolo 1-115
Meeting Competition in the 1970's ... How We Will Test Steels ... Ultrasonic Inclusion Ratings Lift Level of Design Confidence, by Raymond A. Cellitti and Clarence J. Carter..... 4-125
Meeting Competition in the 1970's ... Next-Generation in Industrial Radiography, by Ralph E. Turner 4-200

Plastics
Meeting Competition in the 1970's ... How We Will Cold-Form Plastics, by Walter F. Matras and William R. Meadors 4-165

Plating
Meeting Competition in the 1970's ... How We Will Plate, by John J. Tierney and William E. Lovell 4-170

Process controls
Progress in Process Control
I — New Insights Into Carburizing and Control of Carbon Potential, by Raymond L. Davis II 5-99
II — Versatile Thermocouple With High Output, by Norman F. Spooner and Forbes S. Sibley 5-103
III — Vacuum Sensors for Heat-Treating Applications, by Paul A. Stoudt . 5-104
IV — The Solid-Electrolyte Oxygen Sensor ... Its Features and Uses, by H. S. Spacil 5-106

Processing
Meeting Competition in the 1970's ... Coming Changes in Materials, Processes, MP Round Table 4-129

Quenching
Cryoquenching Eliminates Distortion, by E. M. Holub 1-62

Radiators
The Future of Copper and Aluminum in Auto Radiators
Brazing Aluminum in a Dry Air Atmosphere, By J. R. Terrill 6-70
Fluxless Vacuum Brazing of Aluminum, by Harry K. Herr 6-68
New Copper Alloy Meets New Needs, by W. E. Johnston 6-76
The Roles of Copper and Brass ... 6-73

Radiography
Making Reference Radiographs for Steel Welds, by Roy M. Gustafson and Edward L. Criscuolo 1-115
Meeting Competition in the 1970's ... Next-Generation in Industrial Radiography, by Ralph E. Turner 4-200

Residual stress
Determining Residual Stresses Rapidly, by Eric W. Weinman, Joseph E. Hunter, and Douglas D. McCormack 1-88

Sensors
Progress in Process Control
III — Vacuum Sensors for Heat-Treating Applications, by Paul A. Stoudt 5-104
IV — The Solid-Electrolyte Oxygen Sensor ... Its Features and Uses, by H. S. Spacil 5-106

Sheet
Fatigue Failures in Sheet Metal, by J. Richard Wood and Stanley B. Oxborrow 1-68
Meeting Competition in the 1970's ... How We Will Predict Sheet Metal Formability, by Arthur S. Kasper .. 4-159

New Knowledge About Sheet Steel . . . Controlling the Dimensions, by Donald J. Blickwede 3-99
The Importance of Surface Composition, by Donald J. Blickwede 5-77
Inclusions and Surface Imperfections, by Donald J. Blickwede 6-98
Strain Aging and Its Effects, by Donald J. Blickwede 1-91

Specifications
What You Should Know About Specifications for High-Strength Steels, by Carl R. Weymueller 2-84

Stainless steels
Materials Systems for High-Speed Trains . . . I — The Stainless Steel Metroliner, by Fred L. Siegrist 5-67
New Steel Has Cryogenic Potential, by Carl E. Spaeder Jr., John C. Majetich, and Kenneth G. Brickner 1-57
Properties of Alloys for Low-Temperature and Cryogenic Service (ds) ... 1-71

Steels
Aluminum vs Steel in Transmission Line Structures, by L. A. Kirkpatrick 3-82
Exploiting the Strain Hardening of Steels, by Elliot S. Nachtman and Norman N. Breyer 3-103
An Extra-Strong Maraging Steel, by Richard J. Henry and Robert A. Cary 3-127
Meeting the Competition of the 1970's . . . How We Will Test Steels . . . Ultrasonic Inclusion Ratings Lift Level of Design Confidence, by Raymond A. Cellitti and Clarence J. Carter.... 4-125
A New Group of Boron-Treated Steels, by John A. Rinebolt 3-117
New Knowledge About Sheet Steel . . . Controlling the Dimensions, by Donald J. Blickwede 3-99
The Importance of Surface Composition, by Donald J. Blickwede 5-77
Inclusions and Surface Imperfections, by Donald J. Blickwede 6-98
Strain Aging and Its Effect, by Donald J. Blickwede 1-91
Continuous Casting Promises Improved Steels, Higher Productivity, Staff Report 3-109

Strain aging
New Knowledge About Sheet Steel . . .
Strain Aging and Its Effect, by Donald J. Blickwede 1-91

Strain hardening
Exploiting the Strain Hardening of Steels, by Elliot S. Nachtman and Norman N. Breyer 3-103

Stress relieving
Stress Relieving With Light, by Durward E. Wilcox 3-101

Stress-rupture tests
Short-Term Tests Predict Long-Term Creep-Rupture Data, by Donald R. Muzyka and C. Raymond Whitney .. 1-86

Stretch forming
Cryogenic Stretch Forming Improves Strength of Vessels, by Arthur Cozewith 1-64

Structural steels
Developments in Plate and Structural High-Strength Steels, by William J. Murphy and Ralph B. G. Yeo 3-85

Thermocouples
Progress in Process Control . . . II — Versatile Thermocouples With High Output, by Norman F. Spooner and Forbes S. Sibley 5-103

Titanium alloys
Beta III Titanium Features 'Cold' Formability, by John B. Guernsey, Vincent C. Petersen, and Edward J. Dulis.... 5-121
Properties of Alloys for Low-Temperature and Cryogenic Service (ds) 1-71

Trains
Materials Systems for High-Speed Trains
I — The Stainless Steel Metroliner, by Fred L. Siegrist 6-103
II — The All-Aluminum TurboTrain, by Fred L. Siegrist 5-67

Transmission lines
Aluminum vs Steel in Transmission Line Structures, by L. A. Kirkpatrick 3-82

Transportation
Materials Systems for High-Speed Trains
I — The Stainless Steel Metroliner, by Fred L. Siegrist 5-67
II — The All-Aluminum TurboTrain, by Fred L. Siegrist 6-103

Ultrasonic testing
Meeting the Competition of the 1970's . . . How We Will Test Steels . . . Ultrasonic Inclusion Ratings Lift Level of Design Confidence, by Raymond A. Cellitti and Clarence J. Carter 4-215

Welding
How to Weld High-Strength Steels, by Neale E. Orrok 2-79
Meeting Competition in the 1970's . . . How We Will Weld, by Neale E. Orrok 4-147
Welding Metals for Cryogenic Service — Pulse-Powered Welding Has Out-of-Position Capability, by Larry M. Layden 1-59
Welding Metals for Cryogenic Service — Short-Arc Welding Technique Minimizes Magnetic Problems in 9% Ni Steel 1-61

X-ray diffraction
Determining Residual Stresses Rapidly, by Eric W. Weinman, Joseph E. Hunter, and Douglas D. McCormack 1-88

AUTHOR INDEX

Barish, Herman B. 1-99
Bingham, John T. 3-80
Blakeley, Richard H. 3-78
Blickwede, Donald J. ..1-91; 3-99; 5-77; 6-102
Boynton, F. W. 5-127
Bravenec, Edward V. 2-75
Breyer, Norman N. 3-103
Brickner, Kenneth G. 1-57
Brown, Clarence K. 3-74

Carter, Clarence J. 4-215
Cary, Robert A. 3-127
Caum, J. W. 6-84
Cellitti, Raymond A. 4-215
Coburn, Seymour K. 2-77
Cozewith, Arthur 1-64
Criscuolo, Edward L. 1-115

Davis, Raymond L. II 5-99
Drayton, George H. 3-71
Dulis, Edward J. 5-121

Foster, Allan D. 1-83
Fox, Marion M. 6-99
French, George T. 6-80

Glessner, Clayton 3-76
Graham, James A. 6-87
Graham, John D. 6-79
Gray, Allen G. 1-51; 2-65; 3-67; 4-127; 5-65; 6-67
Greening, William J. 3-69
Grozier, John D. 2-67
Guernsey, John B. 5-121
Gustafson, Roy M. 1-115

Hahn, Russell H. 6-86
Hall, A. M. 2-103
Henry, Donald J. 5-81
Henry, Richard J. 3-127
Herr, Harry K. 6-68
Hickey, Robert L. 2-75
Hoersch, Albert Jr. 2-72
Holub, E. M. 1-62
Hull, Frederick C. 5-139
Hunter, Joseph E. 1-88

Jacobs, Robert E. 2-99
Jamieson, Ronald M. 2-68
Johnston, W. E. 6-76
Jolly, Alexander H. Jr. 2-78
Just, Erwin 5-87

Kasper, Arthur S. 4-159
Kirkpatrick, L. A. 3-82
Korchynsky, Michael 2-67
Krabacher, Edward 4-177

Layden, Larry M. 1-60
Levy, Bernard S. 2-74
Lewis, Charles F. 3-90
Lovell, William E. 4-170

Majetich, John C. 1-57
Manning, Donald E. 6-82
Matras, Walter F. 4-165
McCormack, Douglas D. 1-88
McFarland, William H. 2-73
Meadors, William R. 4-165
Melloy, George F.....2-69; 2-70
Morrison, Thomas W. 4-174
Murphy, William 3-85
Muzyka, Donald R. 1-86

Nachtman, Elliot S. 3-103

Orrok, Neale E. 2-79; 4-147
Oxborrow, Stanley B. 1-68

Petersen, Vincent C. 5-121

Reid, Bruce D. 3-79
Rinebolt, John A. 3-117
Rowden, Clifford E. 2-75

Schofield, David W. 3-70
Schwartzberg, Fred R. 1-52
Sherman, Russell G. 3-75
Sibley, Forbes S. 5-103
Siegrist, Fred L. 5-66; 6-107
Signes, Emil G. 2-70
Sims, Chester T. 1-83
Slimmon, Paul R. 2-70
Smith, James H. 2-76
Sokol, Louis T. 6-88
Spacil, H. S. 5-106
Spaeder, Carl E. Jr. 1-57
Spooner, Norman F. 5-103
Stoudt, Paul A. 5-104

Taylor, Edward 3-72
Taylor, Harold L. 2-73
Terrill, J. R. 6-70
Tierney, John J. 4-170
Turner, Ralph E. 4-200

Vaughn, Robert L. 1-99
Vett, John J. 2-76

Weinman, Eric W. 1-88
Weymueller, Carl R. ...2-84; 4-135
Whiteside, Roger B. 3-81
Whitney, Raymond C. 1-86
Wilcox, Durward E. 3-101
Wood, Richard J. 1-68

Yeo, Ralph B. G. 3-85

Zanin, Louis 6-123